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GB 2174476 A GB 2165621 A GB 1193309 A
WO 80/02683 A1

(58) Field of search
UK CL (Edition J) F2U
INT CL[4] F16C 13/00

(54) A conveyor roller

(57) A conveyor roller comprising a hollow cylindrical roller body 2 with a pair of end plates 3 mounted on the roller body. Each end plate is received within and engaged by one of the free ends 13 of the roller body. The free ends are bent radially inwardly to engage a circumferential slot 10 in the rim of each end plate. A rubber sealing ring may be provided in the slot. A support spindle 4 rotatably supports the roller body 2, the support spindle engaging with bearings 17 and associated seals 18 mounted in inwardly facing recesses in the end plates.

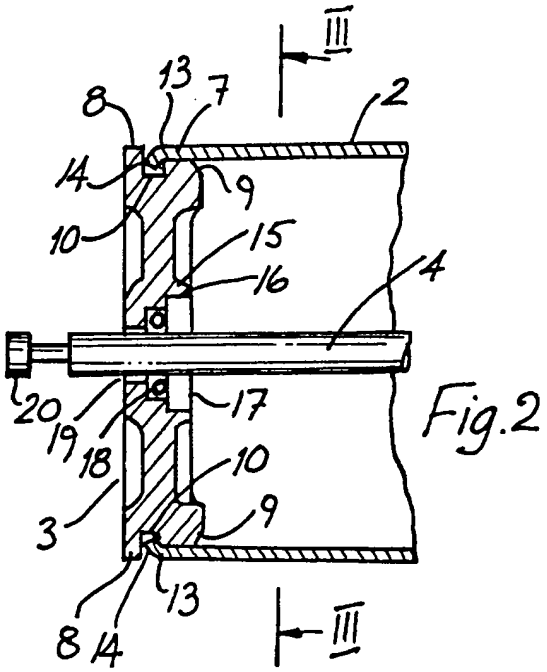

Fig.2

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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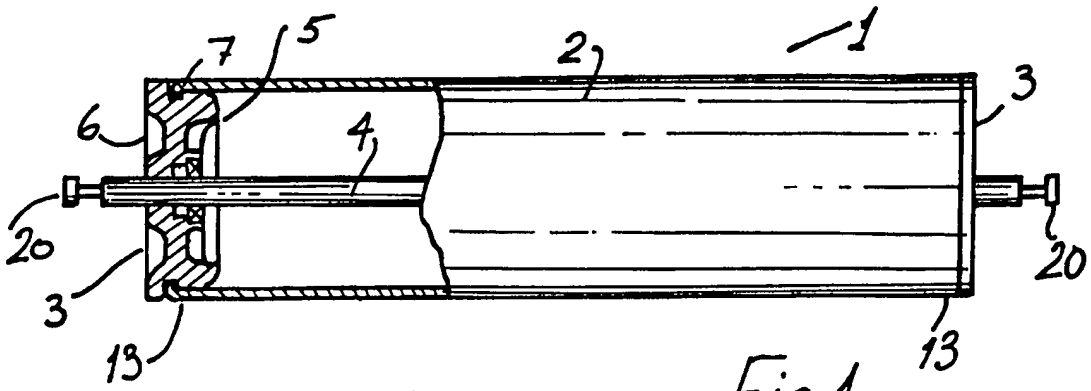


Fig. 1

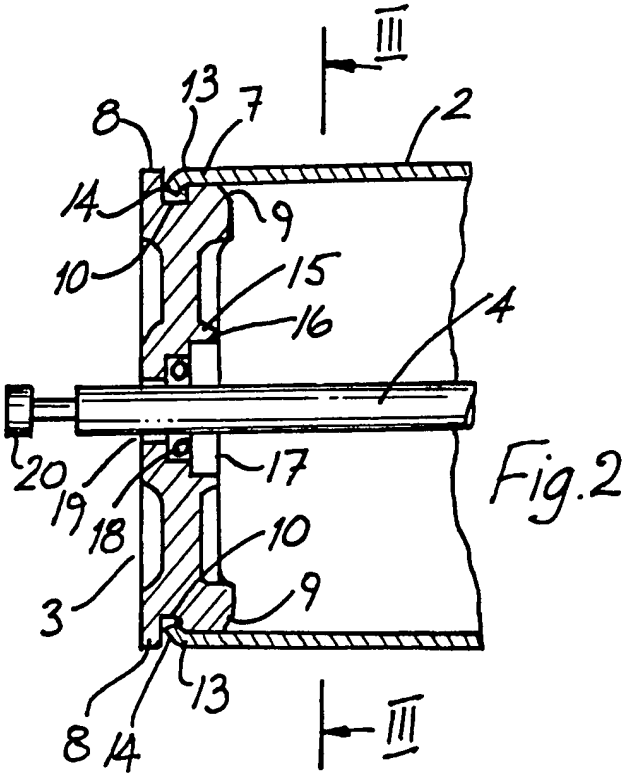


Fig. 2

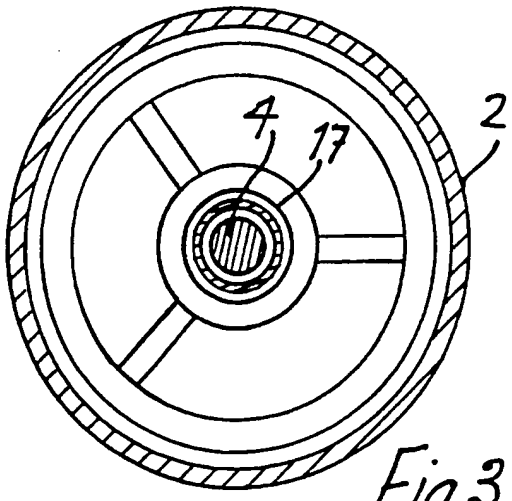


Fig. 3

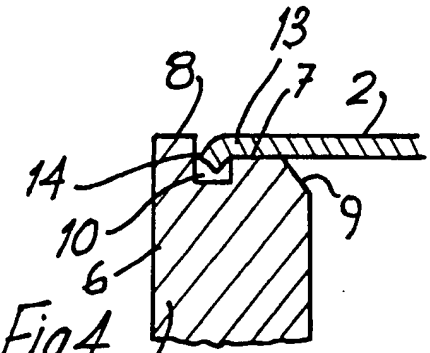


Fig 4

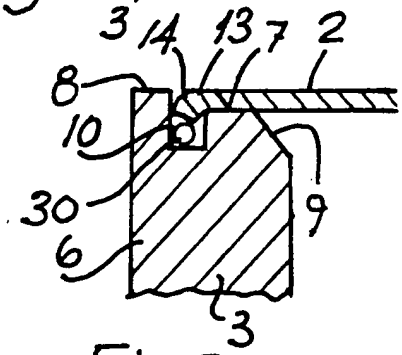


Fig. 5

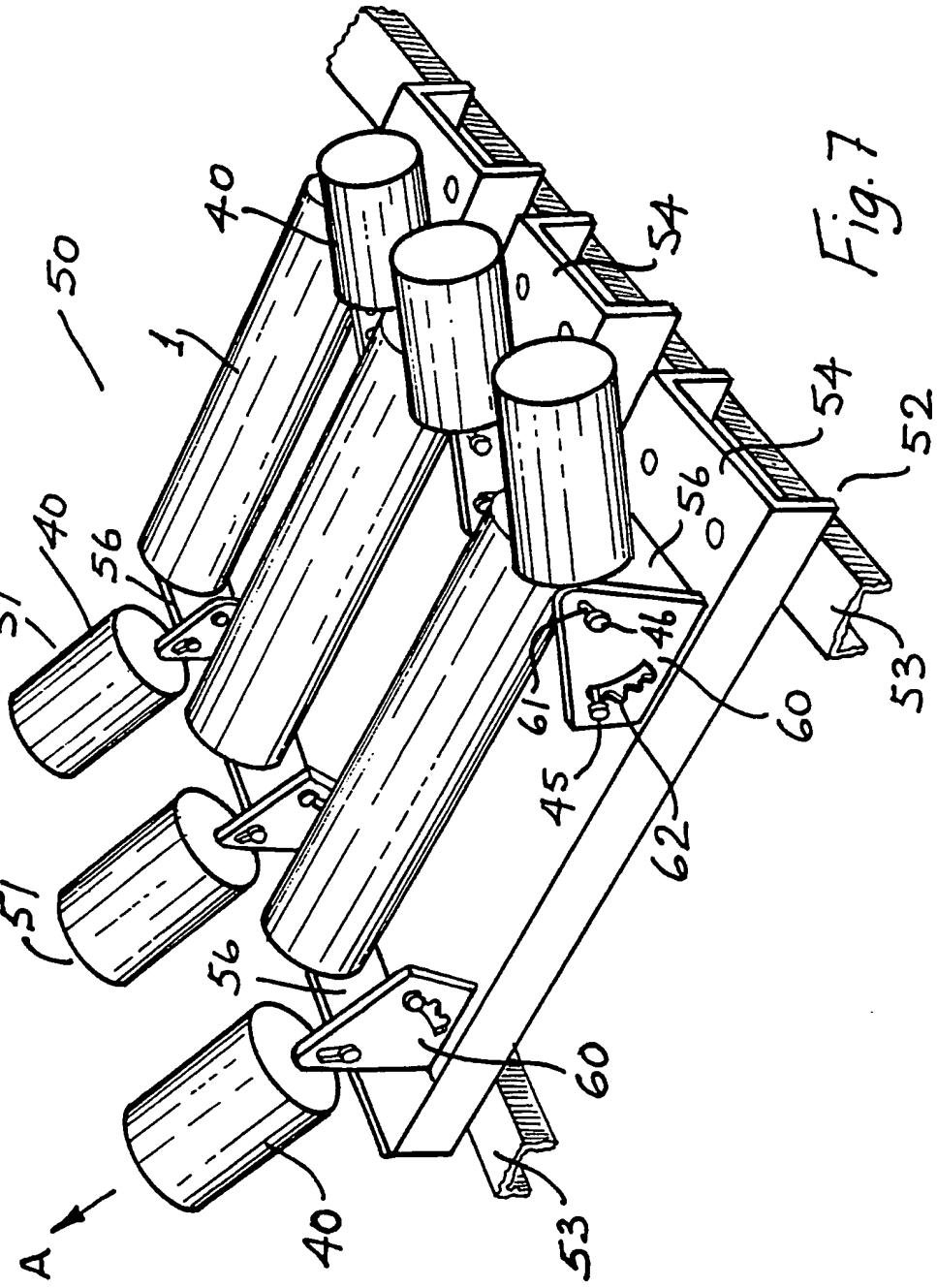
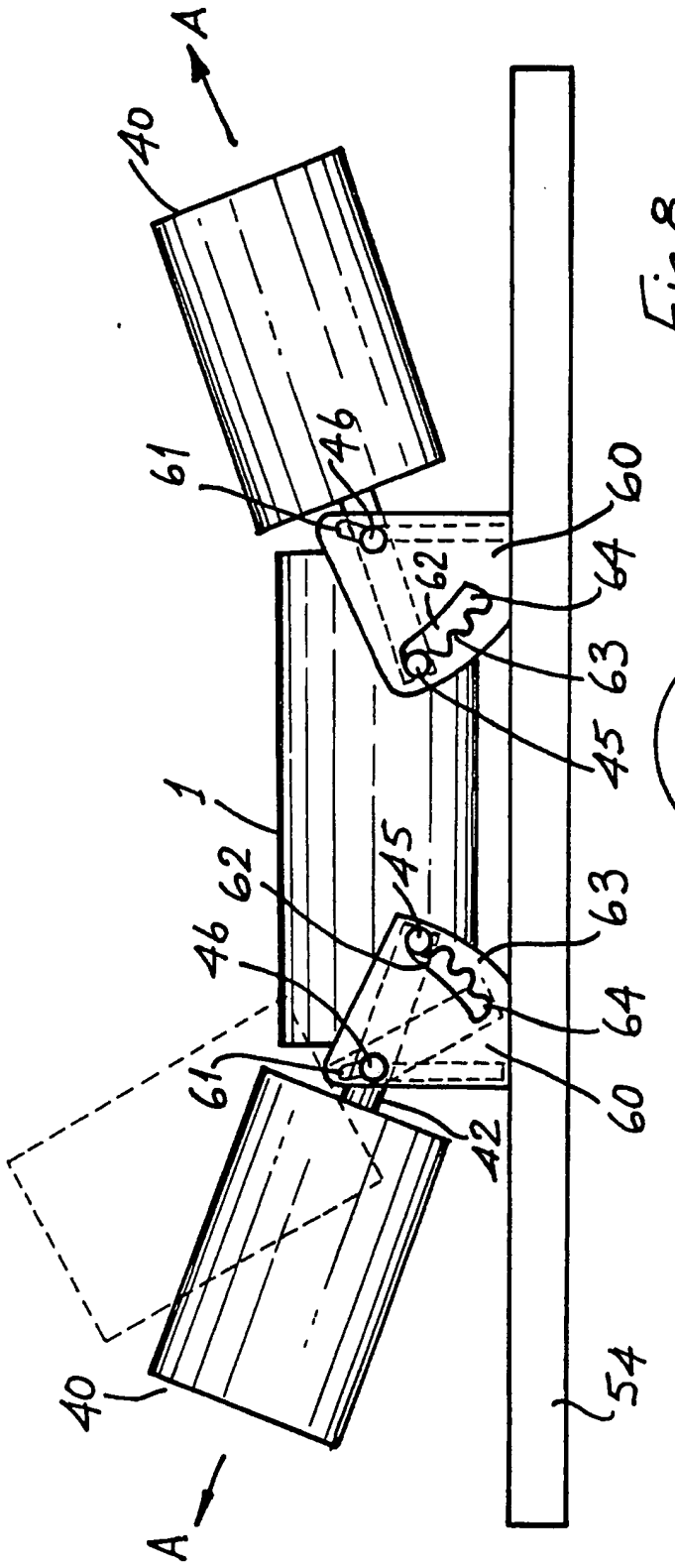


Fig. 7


A
40
61
46
60
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62
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61
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42
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54
A

Fig.8

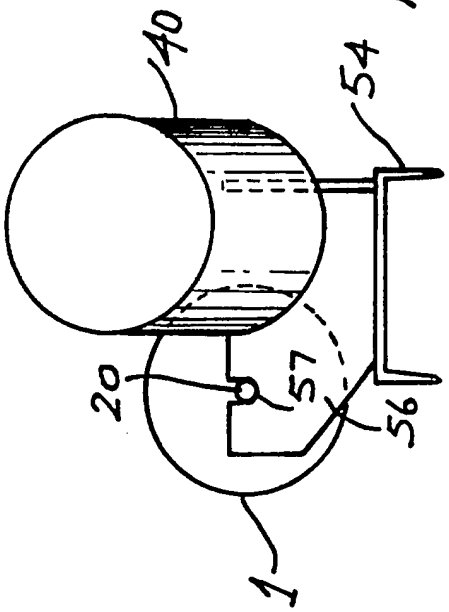
40
54
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Fig.9

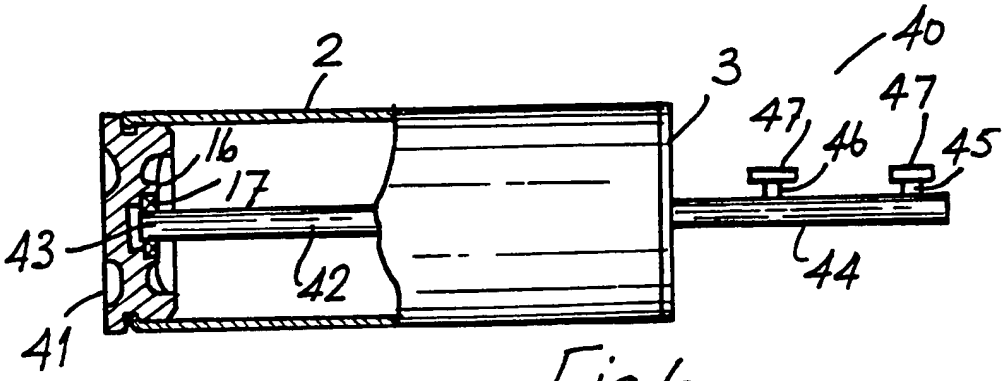

Fig.6

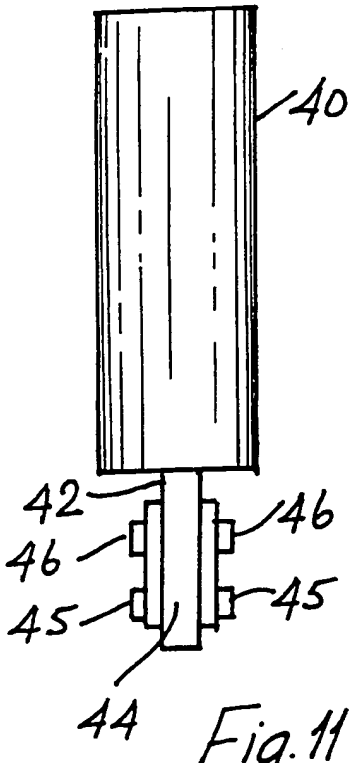

Fig.11

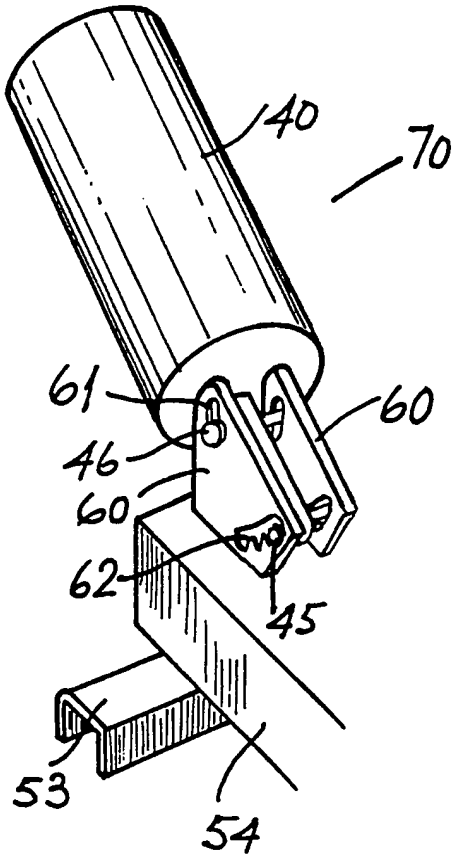

Fig.10

A CONVEYOR ROLLER

This invention relates to a roller for a conveyor, particularly a hollow cylindrical roller, and conveyor roller assemblies incorporating the roller.

It is known to provide a conveyor roller having a hollow cylindrical roller body with a pair of end plates welded to each end of the body. The roller body is rotatably supported on a spindle which passes through the roller body engaging with bearings mounted in the end plates. The bearings are generally mounted in outwardly facing recesses in the end plates and a seal is mounted outwardly of each bearing to prevent ingress of dirt and moisture to the bearing.

To ensure proper operation and long life of the bearings it is essential that the end plates are correctly mounted on the roller body otherwise uneven loading on the bearings when the roller is in use will rapidly wear out the bearing. As the end plates are welded onto the roller body the heat of the welding process can distort the roller body thus effecting the

correct alignment of the bearings and leading to premature deterioration of the bearings.

The sealing arrangement is also important as any dirt or moisture reaching the bearings will greatly increase bearing wear. It has been found that it is particularly advantageous to mount both the bearing and seal in an inwardly facing recess on the end cover as this enhances the protection given to the bearing.

It is an object of the invention to provide an improved conveyor roller of relatively simple construction which ensures good alignment of the bearings mounted on the roller and also provides improved protection for the bearings against ingress of dirt and moisture.

According to the invention there is provided a conveyor roller comprising a hollow cylindrical roller body, a pair of end plates for the roller body, a support spindle rotatably supporting the roller body, and engagement means for engaging the roller body with each end plate, the engagement means comprising a male part on one of the roller body or end plate engagable with a female slot means in the other of the roller body or end plate. Preferably the female slot means comprises

a slot in each end plate and the male part is formed at the free ends of the roller body.

Sealing means may be provided in the slot to provide a dirt and moisture-proof seal between the end plate and the roller body. Typically the sealing means is of elastomeric material. Ideally the sealing means is a ring seal.

In a particularly preferred embodiment of the slot is a circumferential slot in a rim of the end plate and the end of the roller body is bent radially inwardly into the slot.

The invention also provides a method of manufacturing a conveyor roller comprising a hollow cylindrical roller body having a pair of end plates mounted thereon, the method comprising the steps of;

(a) inserting each end plate into an end of the roller body so that the end of the roller body overlies a circumferential slot in a rim of the end plate, and

(b) engaging the end of the roller body with the slot.

Preferably each end of the roller body is engaged with the slot in an end plate by crimping the end of the roller body to bend the end of the roller body radially inwardly into the slot.

In another embodiment there is provided a conveyor roller comprising a hollow cylindrical roller body, a pair of end plates for the roller body, a support spindle rotatably supporting the roller body, and engagement means for engaging the roller body with the end plates, wherein the support spindle engages with a bearing in each end plate and the support spindle extends outwardly of either one or both of the end plates through a central hole in the or each end plate, each end plate through which the spindle passes having a seal mounted outwardly of the bearing adjacent the hole, each bearing and seal being mounted in an inwardly facing recess in the end plate.

In another aspect of the invention there is provided a conveyor roller assembly comprising a number of the rollers mounted on a support member. Preferably the conveyor roller assembly comprises a support member, a pair of spaced-apart wing rollers each mounted on the support member by a plate member and flanking a centre roller, each wing roller being mounted on a spindle having an end portion extending away from the roller, the end portion having a locating pin and a spaced-apart adjustment pin, each plate member having a complementary adjustment slot for engaging the adjustment pin, and spaced-apart locating recesses for reception of the locating pin, the adjustment slot and pin being shaped for axial movement along the axis of the wing roller and pivotal movement of the pin in the slot, the adjustment pin being moved axially through the slot for disengagement and

engagement of the locating pin in a recess and being pivoted in the slot to move the locating pin radially from one recess to another to vary the angle of inclination of each wing roller relative the axis of rotation of the centre roller to form therewith a troughing assembly.

In another embodiment a pair of spaced-apart plate members is provided on the support member for supporting each wing roller, the end portion of the spindle of the wing roller being mounted between and engaging with both of the plate members.

The invention will be more clearly understood from the following description of some embodiments thereof, given by way of example only, with reference to the accompanying drawings.

Fig. 1 is a partially sectioned front elevational view of a conveyor roller according to the invention,

Fig. 2 is a detail sectioned front elevational view illustrating one end of the roller,

Fig. 3 is a partially sectioned view taken along the line III-III of Fig. 2,

Fig. 4 is a detail sectional view illustrating engagement between a roller body and an end plate of the roller,

Fig. 5 is a detail view similar to Fig. 4 illustrating portion of another roller,

Fig. 6 is a partially sectioned front elevational view of a further roller,

Fig. 7 is a perspective view of portion of a conveyor incorporating a roller conveyor assembly according to the invention,

Fig. 8 is a front elevational view of one roller assembly of Fig. 7,

Fig. 9 is an end view of the roller assembly of Fig. 8,

Fig. 10 is a perspective view of portion of another roller conveyor assembly, and

Fig. 11 is a plan view of the roller assembly portion of Fig. 10.

Referring to the drawings and initially to Figs. 1 to 4 thereof there is illustrated a conveyor roller according to the invention indicated generally by the reference numeral 1. The roller 1 has an elongate hollow cylindrical roller body 2 having a pair of end plates 3, the roller body 2 being rotatably mounted on a central support spindle 4. Each end plate 3 has an inner face 5, an outer face 6 and a circular rim 7. The rim 7 has a flanged outer edge 8 and a chamfered inner edge 9. A circumferential slot 10 is provided in the rim 7 adjacent the outer edge 8. Each end plate 3 is a force fit within one of the free ends 13 of the roller body 2, an outer edge 14 of which forms a male part which is bent radially inwardly into the slot 10. A central portion 15 of each end plate 3 has an inwardly facing stepped recess 16 within which is mounted a ball bearing 17 and a ring seal 18 which engages the spindle 4. The seal 18 is mounted outwardly of the bearing 17 adjacent a central hole 19 in the end plate 3 through which the spindle 4 passes. It will be noted that the diameter of the through hole 19 is only slightly larger than the diameter of the spindle 4.

In use, the outer ends 20 of the spindle 4 are mounted on a support bracket of a conveyor roller assembly which is

described later and the roller body 2 is freely rotatable on the spindle 4.

It will be appreciated that the invention provides a conveyor roller of relatively simple and robust construction. The roller 1 can be manufactured quickly and accurately, the roller body 2 being forced on to each end cover 3 and the outer edge 14 of the roller body 2 being crimped inwardly to engage the circumferential slot 10 ensuring an effective seal between the end plate 3 and roller body 2. Very little heat is generated in the pressing operation unlike during the manufacture of other rollers in which end plates are welded to a roller body and therefore the danger of distortion of the body and\or end cover due to heat leading to misalignment of the bearings is removed.

Mounting the bearings 17 for the support spindle 4 in inwardly facing recesses 16 in the end covers 3 gives improved protection to the bearings 17 against ingress of dirt and moisture. As the hole 19 through which the spindle 4 projects is of only slightly larger diameter than the spindle 4 itself this helps to restrict the ingress of dirt and moisture. The seal 13 effectively prevents any moisture or dirt that does pass through the hole 19 from reaching the bearing 12.

Fig. 5 shows a portion of another roller which is largely similar to the roller described previously with reference to Figs. 1 to 4 and like parts are assigned the same reference

numerals. In this case sealing means comprising a rubber ring 30 is provided mounted in the slot 10 of each end plate 3 as additional protection at the rim 7 against the ingress of dirt and moisture to the interior of the roller body 2.

Referring now to Fig. 6 there is illustrated a wing roller 40 according to another embodiment of the invention, the wing roller 40 for a troughed conveyor assembly to be described later. The wing roller 40 is substantially similar to the roller described previously with reference to Figs. 1 to 4 and like parts are assigned the same reference numerals. The wing roller 40 comprises a roller body 2 having a pair of end plates, in this case comprising an inner end plate 3 and an outer end plate 41. The only difference between the end plates is that the outer end plate 41 does not have a central through hole extending outwardly of the stepped recess 16 and thus the outer end plate 41 effectively closes and seals an outer end of the roller body 2. A support spindle 42 engages with a ball bearing 17 in the inner end plate 3 through which it passes and an outer end 43 of the spindle 42 engages with a bearing 17 in the stepped recess 16 of the outer end plate 41. The roller body 2 is thus freely rotatable on the spindle 42. An inner end 44 of the spindle 42 extends outwardly of the inner end plate 3 and has a laterally extending locating pin 45 and spaced apart therefrom a laterally extending adjustment pin 46 each of which has a flanged retaining head 47.

Referring now to Figs. 7 to 9 there is illustrated a portion of a troughed belt conveyor indicated generally by the reference numeral 1 in which the belt has been removed for clarity. The conveyor portion 1 comprises three roller assemblies indicated generally by the reference numeral 51, which incorporate a number of the rollers described previously with reference to Figs 1 to 6, mounted on a base support framework indicated generally by the reference numeral 52. The base support framework 52 has a pair of parallel spaced-apart longitudinally extending side members 53 of inverted channel section. Each roller assembly 51 has a support member 54 each end of which is bolted to one of the side members 53, the support member 54 being mounted substantially perpendicularly to the side members 53. A pair of spaced-apart support brackets 56 project upwardly from each base member 54, the support brackets 56 receiving and supporting a centre roller 1 therebetween. A slot 57 is provided at an upper edge of each support bracket 56 to receive an outer end 20 of the spindle 4 of the centre roller 1, as shown in Fig. 9.

A pair of cantilevered wing rollers 40 are mounted on the base member 54 adjacent each end of the centre roller 1. It will be noted that the wing rollers 40 are offset longitudinally from the axis of rotation defined by the spindle 4 of the centre roller 1. The wing rollers 40 are mounted to extend outwardly and upwardly of the centre roller 1 to define therewith a troughing assembly. Means is provided for varying the angle of inclination of each wing roller 40 relative to

the axis of rotation of the centre roller 1, said means comprising a plate member 60 mounted on and upstanding from the base member 54. Each plate member 60 has an adjustment slot 61 for reception of the adjustment pin 46 on the spindle 42 of the wing roller 40 and an arcuate slot 62 for reception of the locating pin 45 on the spindle 42. Three lugs 63 project into the slot 62 to define four recesses 64 each of which is engagable by the locating pin 45 to set the angle of inclination of the wing roller 40. The heads 47 on the pins 45, 46 retain the pins 45, 46 in position in their respective slots 61, 62. It will be noted that the radius of the arcuate slot 62 is substantially equal to the spacing between the locating pin 45 and the adjustment pin 46 to facilitate ease of insertion and withdrawal of the pins 45, 46. For ease of assembly the pins 45, 46 are inserted through the slots 61, 62 and threadedly engage tapped holes in the spindle 42 of the wing roller 40.

In use, the conveyor 50 is operated in conventional manner with a belt (not shown) passing over the freely rotating rollers 1, 40. The angle of inclination of the wing rollers 40 can be quickly and easily altered to change the troughing effect on the belt. To vary the angle of inclination of a wing roller 40 relative to the axis of rotation of the centre roller 1 the wing roller 40 is moved outwardly and upwardly, generally in the direction of arrow A of Fig. 8, so that the adjustment pin 46 is located at an upper end of the slot 61 and the locating pin 45 is disengaged from the recesses 64.

By pivoting the wing roller 40 about the adjustment pin 46 the locating pin 40 can be moved along the arcuate slot 62 until it is aligned with the required recess 64. Then by moving the wing roller 40 axially inwardly the locating pin 45 is engaged with the required recess 64. As the locating pin 45 is engaged the adjustment pin 46 slides downwardly in the adjustment slot 61. An alternative position for one of the wing rollers 40 is shown in broken outline in Fig. 8.

It will be appreciated that the roller assembly 51 allows quick and easy adjustment of the inclination of each wing roller 40. Also should replacement of any of the rollers 1, 40 be necessary this can also be effected quickly. It will also be noted that as the outer end cover 41 of the wing rollers 40 is closed this will prevent any ingress of dirt or moisture which could adversely effect the bearings 17 on which the roller body 2 is supported.

Referring now to Figs. 10 and 11 there is illustrated portion of another roller assembly 70 which is largely similar to the roller assembly described with reference to Figs. 7 to 9 and like parts are assigned the same reference numerals. In this case each wing roller 40 is mounted between and engages with a pair of spaced-apart plate members 60 mounted on the base member 54. Locating pins 45 and adjustment pins 46 pass through the arcuate slot 62 and adjustment slot 61 of each plate member 60 and threadedly engage tapped holes in the

inner end 44 of the spindle 42 of the wing roller 40. This arrangement gives additional support for the wing roller 40.

Claims

1. A conveyor roller comprising a hollow cylindrical roller body, a pair of end plates for the roller body, a support spindle rotatably supporting the roller body, and engagement means for engaging the roller body with each end plate, the engagement means comprising a male part on one of the roller body or end plate engagable with a female slot means on the other of the roller body or end plate.

2. A conveyor roller as claimed in claim 1 wherein the female slot means comprises a slot in each end plate and the male part is formed at the free ends of the roller body.

3. A conveyor roller as claimed in claim 1 or 2 wherein sealing means is provided in the slot to provide a dirt and moisture - proof seal between the end plate and the roller body.

4. A conveyor roller as claimed in claim 3 wherein the sealing means is a seal of elastomeric material.

5. A conveyor roller as claimed in claim 4 wherein the seal is a ring seal.

6. A conveyor roller as claimed in any of claims 2 to 5 wherein the slot is a circumferential slot in a rim of the end plate and the end of the roller body is bent radially inwardly into the slot.

7. A method of manufacturing a conveyor roller comprising a hollow cylindrical roller body having a pair of end plates mounted thereon, the method comprising the steps of;

(a) inserting each end plate into an end of the roller body so that the end of the roller body overlies a circumferential slot in a rim of the end plate, and

(b) engaging the ends of the roller body with the respective slots.

8. A method of manufacturing a conveyor roller as claimed in claim 7 wherein the ends of the roller body are engaged with the respective slots in the end plates by crimping the ends of the roller body to bend each end of the roller body radially inwardly into the respective slots.

9. A conveyor roller whenever made by the method of claim 7 or claim 8.

10. A conveyor roller comprising a hollow cylindrical roller body, a pair of end plates for the roller body, a support spindle rotatably supporting the roller body, and engagement means for engaging the roller body with each end plate, wherein the support spindle engages with a bearing in each end plate and the support spindle extends outwardly of either one or both of the end plates through a central hole in the or each end plate, each end plate through which the spindle passes having a seal mounted outwardly of the bearing adjacent the hole, each bearing and seal being mounted in an inwardly facing recess in the end plate.

11. A conveyor roller assembly comprising a number of the rollers as calmed in any of claims 1 to 6 or claim 9 or claim 10.

12. A conveyor roller assembly as claimed in claim 11 comprising a support member, a pair of spaced-apart wing rollers each mounted on the support member by a plate member and flanking a centre roller, each wing roller being mounted on a spindle having an end portion extending away from the wing roller, the end portion having a locating pin and a spaced-apart adjustment pin, each plate member having a complementary adjustment slot for engaging the adjustment pin, and spaced-apart locating recesses for reception of the locating pin, the adjustment slot and pin being shaped for axial movement

along the axis of the wing roller and pivotal movement of the pin in the slot, the adjustment pin being moved axially through the slot for disengagement and engagement of the locating pin in a recess and being pivoted in the slot to move the locating pin radially from one recess to another to vary the angle of inclination of end wing roller relative to the axis of rotation of the centre roller to form therewith a troughing assembly.

13. A conveyor roller assembly as claimed in claim 12 wherein a pair of spaced-apart plate members are provided on the support member for supporting each wing roller, the end portion of the spindle of the wing roller being mounted between and engaging with both of the plate members.

14. A conveyor substantially as hereinbefore described with reference to the accompanying drawings.

15. A method of manufacturing a conveyor roller substantially as hereinbefore described with reference to the accompanying drawings.

16. A conveyor roller assembly substantially as hereinbefore described with reference to the accompanying drawings.

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